

## C. Environmental Resources

### 1. Geology

The barrier island on which Long Beach is located lies within the Atlantic Coastal Plain Province, which extends beneath the Atlantic Ocean about 100 miles offshore to the edge of the continental shelf. The southern portion of Long Island is a low glacial outwash plain, which slopes southward towards the ocean. The “physiographic root” is formed by two terminal moraines along the northern side of Long Island. The area is underlain by eight geological units of unconsolidated deposits of sand, gravel, and clay that were laid down in parallel beds on the surface of hard, crystalline bedrock bedrock.<sup>1</sup>

The north shore is frequently categorized by a bluff and is indented by bays. From the southernmost moraine, the land surface slopes gently southward toward the Atlantic Ocean. The southern shoreline is poorly defined, merging into salt marshes. Surface formations are composed of unconsolidated sands, gravels, and some clays therefore, precipitation infiltrates quickly and streams are small with a steady flow from underground sources.<sup>2</sup>

#### a. Hydrogeology

The City obtains all of its water from deep wells screened in the deepest water bearing formation in Nassau County, the Lloyd formation. The formation rests upon bedrock varying between 1,400 and 1,500 feet below sea level. The surface of the bedrock slopes at a rate of 60 to 80 feet per mile or 1½ percent to the southeast. The rock consists primarily of schists and gneisses. The Lloyd sands are a Cretaceous Age deposit and a member of the Raritan formation, believed to be about 100 million years old. Withdrawals from the Lloyd formation, reduced water levels in the overlying source strata, and the presence of a confining relatively impervious Raritan clay overlying the Lloyd formation, all contribute to the lower piezometric heads in the formation and the cessation of free flowing wells.

The Raritan clay is a member of the Raritan formation and is composed mostly of silty clays and non-continuous layers of sand beneath Long Beach, it is about 300 feet thick and 900 feet below sea level. The impervious nature of the Raritan clay makes it unusable for water supply. However, it provides protection to the Lloyd sands against saltwater encroachment from above. The Raritan clay is overlain by the Matawan group, referred to as the Magothy formation. The formation is salted beneath Long Beach, therefore, unusable as public water supply. A number of the shallower Magothy wells have experienced deteriorating water quality from nitrate pollution. This indicates that existing and future wells may require deeper screening to remedy nitrate pollution. Extensive deepening may affect the hydraulics within the Lloyd formation beneath Long Beach, which could lead to heavy salting. Such

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<sup>1</sup> Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Final Feasibility Report with Final Environmental Impact Statement, Storm Damage Reduction Project, New York District, North Atlantic Division, Corp of Engineers, March 1998, FEIS page 15

<sup>2</sup> United States Department of Agriculture. Soil Survey of Nassau County, New York. February 1987.

salting would destroy the only source of fresh water supply within the boundaries of the City of Long Beach.<sup>3</sup>

b. Surficial Geology

Most of the major features of the present-day topography of Long Island are a result of the Pleistocene glaciation and are oriented in belts or ridges parallel to the island's length. The most prominent are two east-west trending morainal ridges (Ronkonkoma and Harbor Hill moraines) that traverse the island. Neither of these moraines are located within the borders of the City of Long Beach. Long Beach is considered part of the outwash plain slope that extends southward from the base of the Ronkonkoma Moraine in Nassau County to the southern shore. The outwash plain has an altitude of 100 to 150 feet along its northern border and slopes southward at about 20 feet per mile. It is overlain by recent deposits of sand, silt, and organic material along the south-shore beaches and along stream channels.<sup>4</sup>

2. Topography

The topography of Long Beach is typical of most barrier beach areas. It is extremely flat, with grades slightly higher near the ocean beaches. Grades vary, generally between eight and 11 feet above mean sea level along the beachfront to grades at Reynolds Channel from five to seven feet above mean sea level.<sup>5</sup> Elevations are generally less than 10 feet above the National Geodetic Vertical Datum (NGVD).<sup>6</sup>

3. Soils

Long Beach is generally classified as Udipsamments-Beaches-Urban Land. This classification, which consists of more than one type of soil, is dominantly nearly level or gently sloping, excessively drained to moderately well drained, contains coarse textured soils, beaches, and urban land on barrier beaches.<sup>7</sup>

As shown in Exhibit \_\_\_\_, Soil Survey, the City of Long Beach is classified as entirely Urban Land, split into Urban Land, Urban Land – Udipsamments complex and Urban Land – Udipsamments, wet substratum complex. Along the Atlantic Ocean, the soils are classified as Beaches. Each of these soil types is described below.<sup>8</sup>

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<sup>3</sup> City of Long Beach Nassau County, New York Master Water Plan 1971-1985 prepared by Holzmacher, McLendon & Murrell, P.C.

<sup>4</sup> U.S. Department of the Interior and U.S. Geological Survey. *Water-Table and Potentiometric-Surface Altitudes of the Upper Glacial, Magothy and Lloyd Aquifers on Long Island, NY in March-April 2000, with a Summary of Hydrogeologic Conditions*. Water Resources Investigations Report 01-4165.

<sup>5</sup> City of Long Beach Nassau County, New York Master Water Plan 1971-1985 prepared by Holzmacher, McLendon & Murrell, P.C.

<sup>6</sup> Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Final Feasibility Report with Final Environmental Impact Statement, Storm Damage Reduction Project, New York District, North Atlantic Division, Corp of Engineers, March 1998, Page 5

<sup>7</sup> U.S. Department of Agriculture Soil Conservation Service, Soil Survey of Nassau County, New York, Cornell University Agricultural Experimentation Station, General Soil Map, Nassau County, New York 1987

<sup>8</sup> Ibid.

INSERT EXHIBIT 4  
SOIL SURVEY, THE CITY OF LONG BEACH

## a. Soil Classifications

## (1) Bc-Beaches

This soil type consists of strips of nearly level or lightly sloping sand or sand and gravel that are inundated twice each day with saltwater at high tide. Most of the area has no plant cover. Specifically, the beaches along the south shore bordering the Atlantic Ocean are primarily sand. Beaches are used intensively for recreation activities and sunbathing. Location and daily tidal flooding make other uses impractical.

## (2) Ug - Urban Land

At least 85 percent of the surface is covered with concrete, asphalt, or other impervious building material. Areas are mostly parking lots, shopping centers, institutional sites, or industrial parks. Some areas are lightly sloping, and most are almost level. Many of these areas are generally adjacent to local main thoroughfares in business centers in villages and cities. Also included in this category are small areas of soil that have not been significantly altered or that are not under an impervious cover such as areas that are in lawns or other landscaped areas. In many areas rapid or very rapid runoff prevents adequate discharge of runoff from powerful rainstorms to safe outlets. A few areas are in low locations where seasonal wetness sometimes causes temporary flooding of the surface or frost heaving and subsequent breakup of surface pavements.

## (3) Uu-Urban land- Udipsamments complex

This soil type is located in urbanized areas and is excessively drained, very deep soils that have been mixed with other soils or where original soil has been removed. The areas are nearly level with slopes that range generally from zero to three percent. The soil type consists of 70 percent urbanized areas, 25 percent Udipsamments, and five percent other soils. The urbanized areas are houses, commercial buildings, roads, parking lots, and other manmade structures.

The Udipsamments have a surface layer of dark yellowish brown loamy sand about three inches thick. The substratum extends to a depth of 60 inches or more. It is layers of strong brown or brownish yellow sand or gravelly sand. The differences in these layers are often the result of grading. The properties of the Udipsamments are:

- Permeability: Mainly rapid or very rapid
- Water table: At depth of more than six feet
- Available water capacity: Very low
- Runoff: Very slow

Other than areas with structures, udipsamments are located in the areas on which there are no structures but are lawns, gardens, small playgrounds, border strips along streets and sidewalks, and vacant lots. Investigation of the soil is necessary to determine the suitability for sewage effluent disposal. Areas that are large enough, and have few limitations as sites for dwellings with or without

basements, but on-site investigation is necessary to determine the suitability. A lack of open space is a limitation, and pollution of the ground water is a hazard because the sandy material is a poor filter of effluent. Development of roads and recreation facilities is usually not feasible because there is little open land in these soil areas. Dry conditions and low natural fertility limit landscaping. New shrubs and grasses require topsoil, fertilizer, mulch, and irrigation. The urban nature of this soil area makes it unsuitable as habitat for wildlife other than songbirds.

(4) Uw-Urban land-Udipsamments, wet substratum complex

Consists of urbanized areas and excessively drained to moderately well drained, very deep Udipsamments. This soil is located in nearly level tidal areas, mostly adjacent to the Atlantic Ocean, that have been filled with sandy material dredged mainly from adjacent waterways and channels. The fill is four to 10 feet thick over organic tidal marsh sediments. The slope ranges from zero to two percent. The soil type consists of 70 percent urbanized areas; 25 percent Udipsamments, wet substratum; and five percent other soils. The urbanized areas are houses, commercial buildings, roads, parking lots, and other manmade structures. The properties of the Udipsamments are:

- Permeability: Rapid or very rapid in sandy layers; moderate in the organic layers
- Water table: Usually at a depth of four feet or more, but influenced by tidal action
- Available water capacity: Very low
- Runoff: Very slow

The Udipsamments are in lawns, gardens, courtyards, and other open border strips. In many areas, waterways have been cut into the soil to provide docking facilities for adjacent homesites. Most areas are used for housing, and few open areas are available.

Settling and compaction of the organic layers limit the soil as a site for dwellings without basements, and the water table is a limitation for dwellings with basements. Some areas of these soils are limited by tidal flooding during intense coastal storms. The use of pilings helps to overcome or alleviate the settling and wetness.

The water table in the substratum limits this unit as a site for septic effluent disposal. Pollution from effluent is a hazard to ground water or to waters in the adjacent tidal areas because the sandy material is a poor filter. Wetness in the substratum and a high sand content are limitations of the Udipsamments as a site for roads, streets, or recreation, but the main limitation for those uses is a lack of open space. Droughtiness and low natural fertility are the main limitations of the Udipsamments for landscaping. Topsoil, nutrients, and irrigation are needed, and plants must be salt tolerant. This unit is generally unsuitable as habitat for wildlife other than waterfowl in nearby channels and waterways.

It is noted that two local conditions are identified as impacting construction on individual lots. Isolated deposits of clay, known as clay lenses, which are impervious surfaces within sandy soils that create a perch for ground water to sit upon, are found within the City. Along the north shore, heavy organic material known as “bog” is found in the soils.

#### 4. Hydrology

This section is divided into four subsections: Surface Water Resources, Ground Water Resources, and Water Quality and Classification.

##### a. Surface Water Resources

There are no streams, lakes, or ponds within the municipal boundaries of the City of Long Beach.

##### b. Groundwater Resources

Three major freshwater aquifers lie beneath Long Island: the Lloyd, the Upper Glacial, and the Magothy. Of these, the Lloyd Aquifer is by far the largest and deepest. It is a source of drinking water for Long Beach, as well as for many other Long Island municipalities.

The Lloyd Aquifer lies 200 feet beneath the surface on the North Shore and dips to more than 1,500 feet below Fire Island. The Lloyd system is so vast, running in a rough crescent shape from Block Island to the north to Florida to the south, to the Delaware and Raritan Rivers in New Jersey to the west and to the continental shelf off Montauk, not all of its dimensions and constituent parts have been mapped. The Lloyd could contain 100 trillion gallons of fresh water under Long Island alone. All of Long Island's tap water comes from wells, but most of them are drilled into the shallower Upper Glacial and Magothy aquifers. About 10 percent of Nassau County's water wells tap into the Lloyd Aquifer.

In 1986, legislation was passed by New York State that prohibited extraction of water from the Lloyd Aquifer by additional communities to prevent the chance of saltwater intrusion. This moratorium was implemented in recognition of the fact that this aquifer is a tremendously important and fragile source of drinking water where over-pumping had caused the closure of a number of wells whose sides collapsed and were contaminated by salt water.<sup>9</sup> A recent court decision denying pumping from the Lloyd by additional communities reinforced this legislation, protecting the Lloyd from additional extractions.<sup>10</sup>

##### c. Water Quality and Classification

###### (1) Freshwater

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<sup>9</sup> U.S. Department of the Interior and U.S. Geological Survey. *Water-Table and Potentiometric-Surface Altitudes of the Upper Glacial, Magothy and Lloyd Aquifers on Long Island, NY in March-April 2000, with a Summary of Hydrogeologic Conditions*. Water Resources Investigations Report 01-4165.

<sup>10</sup> Raab, Robert, Commissioner, Department of Public Works, City of Long Beach, NY.

Fresh water in Long Beach is withdrawn from the Lloyd Aquifer. There are no other freshwater bodies in Long Beach.

Precipitation is the sole source of all naturally occurring fresh ground water on Long Island. Seasonal or long-term fluctuations in precipitation volume and, thus, in recharge, are reflected by the water levels in all aquifers. Under natural (predevelopment) conditions, about 50 percent of the precipitation that falls on the land surface recharges the ground-water reservoir, but this percentage can vary locally, depending on the climate, geography and land use.<sup>11</sup> In developed Long Beach, much of the overland flow is diverted through a system of storm drains that discharge either to Reynolds Channel or the local Canals

Human activities on Long Island have caused stresses within the ground-water system that have altered the natural balance and produced large-scale changes in the quantity, movement and quality of groundwater in many parts of Long Island. The major causes of stress are increased ground water pumping, installation of storm sewers, sanitary sewers, recharge basins and cesspools, construction of roads, parking lots and other impervious surfaces. Additionally, significant draws from the Lloyd Aquifer have left it increasingly susceptible to saltwater intrusion, particularly in coastal, highly urbanized areas. Saltwater intrusion has indeed occurred in the past in Kings, Queens and southwestern Nassau Counties.<sup>12</sup> Fortunately, over the years, the level of chlorides (an indicator for saltwater) has remained relatively constant (3-6 mg/l) in Long Beach drinking water.

## (2) Salt Water

The surface waters of the Atlantic Ocean and the Long Island Sound drainage basins are dominated by the estuary/marine waters, which cover approximately 905,934 acres (or 1,415 square miles). The Atlantic Ocean coastline stretches for 117.5 miles from Rockaway Point at New York Bay to Montauk Point in eastern Suffolk County.

Given the basin's population density, urban setting, early settlement and resulting aging infrastructure, the waters of the basin experience considerable stress. Numerous sources, such as municipal and industrial discharges, urban storm runoff, combined and separate sewer overflows, contaminated sediments, oil and hazardous material spills, non-point source runoff, landfill leachate, dredge spoil disposal and thermal discharges, all threaten the water quality of the Atlantic Ocean and Reynolds Channel, as well as the nearby waterways. However, in spite of numerous water quality issues, the waters of the basin also remain a rich and valuable economic and ecological resource.<sup>13</sup>

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<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> NY Department of Environmental Conservation, Division of Water, Bureau of Water Assessment and Management. *NYS Water Quality Section 305b Report*. 2004.

In Nassau County, the Atlantic Ocean coastal waters are classified as SA. Class SA waters are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, navigation, and as habitat for fish and other estuarine and marine life. To be classified as SA, the habitat has to be free-flowing and natural. It is assumed that there are no direct discharges of pollutants to Class SA waters, except storm water discharges that are in compliance with state and local requirements.

The western portion of Reynolds Channel, extending from Long Beach Boulevard to Atlantic Beach Bridge is classified SB by the New York State Department of Conservation.<sup>14</sup> Class SB waters are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other estuarine and marine life. The habitat is characterized as unimpaired.

Recreation uses of the western portion of Reynolds Channel (including public bathing) are impacted, and their severity is classified as “stressed,” as a result of pathogens in the water identified as being from boat pollution, storm sewers and urban runoff. Year round shellfishing restrictions apply, and fish consumption is impaired due to a specific NYS DOH health advisory. *The 2006 – 2007 Health Advisories: Chemicals in Sportfish and Game* recommends that striped bass, bluefish and American eels should be eaten in only limited quantities, especially for women and children.<sup>15</sup>

The eastern portion of Reynolds Channel, from Jones Inlet to Long Beach Boulevard is classified as SA. However, shellfishing is completely restricted in this area due to the designation of most of the area as uncertified by DEC for the taking of shellfish for use as food. Public bathing, recreation and fish consumption are classified as being “stressed”. Pathogens from stormwater and urban non-point runoff and recreational boating are the known sources of contamination.

The Hempstead Bay - South Oyster Bay habitat complex includes the entire aquatic habitat of West, Middle, and East Hempstead Bays (adjacent to Reynolds Channel within the South Shore Estuary) and South Oyster Bay, including all salt marsh islands and dredged material islands, as well as the undeveloped sections of the Long Beach and Jones Beach barrier islands. Pathogens, nutrients, and other pollutants from stormwater and urban non-point runoff limit shellfishing, public bathing and other recreational uses in Hempstead Bay. Boat pollution also impacts water quality in the bay. Municipal discharges to adjacent water bodies (specifically from the Long Beach sewage treatment plant, Bay Park sewage treatment plant and west Long Beach sewage treatment plant) may also contribute pollutants. Shellfishing in Hempstead Bay

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<sup>14</sup> Ibid.

<sup>15</sup> New York State Department of Health. 2006 – 2007 Health Advisories: Chemicals in Sportfish and Game.

is restricted due to the designation of the area as uncertified for the taking of shellfish for use as food. The year-round shellfishing closure applies to all the tidal waters of the bay. Pathogens from stormwater and urban non-point and recreational boating are known sources of contamination.

Both Reynolds Channel and Hempstead Bay are listed on the Final New York State 2006 Section 303(d) List of Impaired Waters. The list identifies those waters that do not support appropriate uses and that require development of a Total Maximum Daily Load (TMDL) or other restoration strategy to attain quality standards. Section 303(d) of the Federal Clean Water Act requires states to identify Impaired Waters and consider development of a TMDL or other strategy to reduce the input of specific pollutant(s) that restrict water body uses, in order to restore and protect such uses. Pathogens from urban/storm runoff are identified as the cause and source of pollution in Reynolds Channel. Nitrogen from municipal sources and urban/storm runoff are identified as the cause and source of pollution in Hempstead Bay.

## 5. Environmental Issues

### a. Open Water Disposal

Historically, open water disposal at an ocean site has been the primary method of disposing of sediments dredged from the NY-NJ Harbor Estuary. The New York Bight Dredged Material Disposal Site (Mud Dump Site) was designated in 1984 for disposal of up to 100 million cubic yards of dredged material from the Port of New York and New Jersey and nearby harbors. The Mud Dump Site, and its environs, located 5.3 nautical miles (a nautical mile equals 1.150779 miles or 1,852 meters) east of Highlands, New Jersey and 9.6 nautical miles south of Rockaway, New York has historically been the major option for dredged material disposal since 1914. An average of 4-5 million cubic yards of dredged material from NY/ NJ Harbor had been disposed in the ocean each year.<sup>16</sup>

The Administrator of the EPA and the Secretaries of the Army and of Transportation agreed to close the Mud Dump Site for disposal of dredged material in 1996. This was in response to surveys that had shown that contaminants in the dredged material caused sediment toxicity and bioaccumulation effects in estuarine organisms. For example, worm tissue at the disposal site was found to accumulate dioxins, and both dioxin and polychlorinated biphenyl (PCB) contamination was found in lobsters.<sup>17</sup>

Individual elements of the aforementioned data do not prove that sediments within the Mud Dump Site are imminent hazards to the ecosystem, living resources or human health. However, the collective evidence presents cause for concern, and justifies the finding that a need for remediation exists and that the site should be managed to reduce impacts to acceptable levels.<sup>18</sup> However, simultaneous with the closure of the Mud Dump Site, the site and surrounding areas that have been used historically as

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<sup>16</sup> Dredged Material Management Program. Accessed July 20, 2006 from <http://www.epa.gov/region2/water/dredge/intro.htm>.

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

disposal sites for dredged materials were redesignated as the Historic Area Remediation Site (HARS). The HARS is an approximately 15.7 square nautical mile area, which includes the 2.2 square nautical mile area of the Mud Dump Site. The HARS is restricted to receive only dredged material suitable for use as Material for Remediation. Material for Remediation is defined in the HARS final rule preamble (Code of Federal Regulations' Criteria for the Management of Disposal Sites for Ocean Dumping, September 29, 1997) as uncontaminated dredged material i.e., dredged material that meets current Category I standards (as defined in the Mud Dump Site Code of Federal Regulations' Criteria for the Management of Disposal Sites for Ocean Dumping) and will not cause significant undesirable effects including through bioaccumulation.

Also in the vicinity of Long Beach is the 12 Mile Dumping Ground, which was until recently the main repository for all of New York City's sewage waste, over six million tons annually. The entire area is contaminated with toxic sludge and heavy metals that form a layer of black mud. The 12 Mile Dump was closed in 1987, after 63 years of operation. The average depth is about 100 feet. The area is slowly recovering.<sup>19</sup> See Exhibit \_\_\_\_, HARS Site and 12-Mile Dump for location information.

The City of Long Beach was among the municipalities that used the 12 Mile Mud Dumping Ground for disposition of sludge from its treatment plant. The 1987 federal ocean dumping ban caused Long Beach, like other municipalities, to employ land disposal options.

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<sup>19</sup> New Jersey Scuba. Accessed July 18, 2006 from [http://www.njscuba.net/biology/misc\\_dump\\_sites.html](http://www.njscuba.net/biology/misc_dump_sites.html).

Insert Exhibit 5  
HARS Site and 12 Mile Dump

## 6. Freshwater and Tidal Wetlands

Wetlands are transitional zones between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is actually covered by water either permanently or periodically. Wetlands typically support hydrophytes (plants adapted to wetland conditions) and the substrate is hydric (wet) mineral and/or organic soil that is usually poor to very poorly drained.

### a. Freshwater Wetlands

There are no freshwater wetlands located within or in close proximity to the municipal boundaries of the City of Long Beach.

### b. Tidal Wetlands

Tidal wetlands occur at the land/ocean interface where daily tidal action moves water in and out of the systems. Along the Atlantic and Gulf coasts of the United States, tidal wetlands are found from northern Maine to southern Texas. These areas are periodically flooded by seawater during high or spring tides, and are affected by the cyclic changes in water levels caused by the tidal cycle.

These areas are dominated by grasses and other marsh plants that are adapted to the rise and fall of the tide and the salty water it brings. The blades of marsh grass provide a hiding place for many juvenile fish and habitat for many other animals as well. The grass blades become a vital part of the food chain when they break off and decay, providing food for detritivores (animals that eat decaying organic material) and nutrients to the marine environment.

Tidal wetlands are classified by the New York State Department of Environmental Conservation (NYSDEC), which classifies wetlands by the amount of water covering the area at high and low tides and the type of vegetation. As shown in Exhibit \_\_\_\_\_, 1974 Tidal Wetlands Inventory, the majority of wetlands in the vicinity of the City of Long Beach are classified as Littoral Zone (LZ), which is a tidal wetland that includes all lands under tidal waters that are not included in any other category. No littoral zone land can be located under waters deeper than six feet at mean low water. All of the Atlantic Ocean coastal area is classified as LZ, as are significant areas of Reynolds Channel and all of the Canals.

Intertidal marsh (IM) is the vegetated tidal wetland zone lying generally between average high and low tidal elevation in saline waters. The predominant vegetation in this zone is low marsh cordgrass (*spartina alterniflora*). IM areas are found north of Long Beach, within the Village of Lawrence, between Lawrence and Hempstead, and other wetlands areas north of the Canals.

INSERT EXHIBIT 6  
1974

TIDAL

WETLANDS

INVENTORY

Coastal shoals, bars and mudflats (SM) are part of a tidal wetland zone that at high tide is covered by saline or fresh tidal waters, at low tide is exposed or is covered by water to a maximum depth of approximately one foot and is not vegetated. SM areas surround or are adjacent to the predominant IM areas north of Long Beach. Additionally, a small area west of the Long Beach Boulevard Bridge is classified SM. This area exists along the Reynolds Channel waterfront from between Edwards and National Boulevards to Riverside Boulevard (west to east). This land is a portion of the area identified in the 2007 Long Beach Comprehensive Plan for Planned Waterfront redevelopment to include mixed-use and public or quasi-public uses that supply waterfront access, such as esplanades, fishing piers, boat launches, marinas, open space and restaurants.

Dredge spoil (DS) includes all areas where fill material has been used. High marsh (HM) is the normal upper most tidal wetland zone usually dominated by salt meadow grass (*spartine patens*) and spike grass (*distichlis spicata*). This zone is periodically flooded by spring and storm tides and is often vegetated by low vigor (*spartina alterniflora*) and seaside lavender (*limonium carolinianum*). Upper limits of this zone often include black grass (*juncos gerardi*) and groundsel bush (*baccharis halimifolia*). DS and HM areas can be found in the Village of Lawrence and the tidal wetlands located between Lawrence and Hempstead.

c. Wetland Loss

Historically, all of Long Beach was wetland area. As noted in the history of Long Beach (Chapter II.B), when the original developer of Long Beach, William Reynolds arrived in 1907 Long Beach was swamp with groins. A solid island was formed after Reynolds used dredge material to fill in the groins and brought in soil for the construction of each house.

The NYSDEC administers the Tidal Wetlands Regulatory Program, which is based on the Tidal Wetlands Land Use Regulation (6 NYCRR Part 661). The purpose of this policy is to, "...preserve and protect tidal wetlands, and to prevent the despoliation and destruction, giving due consideration to the reasonable economic and social development of the State."<sup>20</sup> The findings in the Tidal Wetlands Land Use Regulations, which are statutorily authorized under the Environmental Conservation Law, include:

- Tidal wetlands constitute one of the most vital and productive areas of the natural world and collectively have many values.<sup>21</sup>
- Intertidal marsh and coastal fresh marsh tidal wetlands are the most biologically productive of all tidal wetland areas....Because of these high values and sensitive location at the land and water interface, intertidal and coastal fresh marshes must be the most stringently protected and preserved tidal wetlands zones.<sup>22</sup>

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<sup>20</sup> 6 NYCRR Part 661 Tidal Wetlands, Land Use Regulations, §661.1

<sup>21</sup> 6 NYCRR Part 661 Tidal Wetlands, Land Use Regulations, §661.2 (a).

<sup>22</sup> 6 NYCRR Part 661 Tidal Wetlands, Land Use Regulations, §661.2 (d).

In order to evaluate the effectiveness of the state's tidal wetlands program in protecting wetlands under the Tidal Wetlands Act (Article 25 of the Environmental Conservation Law), a tidal wetlands trends analysis is being conducted by the New York State Department of Environmental Conservation. The West Islands within the Middle Bay, located at the eastern end of Long Beach immediately north of Reynolds Channel, is one of the targeted study areas. During the study period, no direct filling or dredging of the vegetated marsh was known to occur. Loss occurred for one or more of the following reasons: wave energy, erosion, sand accretion, sediment budget disruption, subsidence, dredging and sea level rise.<sup>23</sup>

Table Chapter II.C-1 below provides specific information about Middle Bay tidal wetlands loss.

**Table II.C-1**  
**Middle Bay, West Islands Tidal Wetlands Loss<sup>24</sup>**

	<b>Wetland</b>	<b>1974 acreage</b>	<b>1998 acreage</b>	<b>2001 acreage</b>	<b>Acres Lost</b>	<b>% Loss</b>	<b>Acres Lost/Yr.</b>
<b>Middle Bay</b>	West Islands	527	*	404	123	23	4.5

\* Acreage was not calculated for this year

While the State of New York protects tidal wetlands, threats to tidal wetlands and marsh areas continue. Threats include human disturbances such as ditching (for mosquito control), filling, restricting tidal connections, diking and impoundment, pollution, shoreline hardening and structures (bulkheads, groins, jetties and the like), sea level rise, and natural disturbances such as seasonal disturbances (ice sheets up rooting vegetation) and natural disasters. Ditching and filling account for the largest salt marsh losses in New York State.<sup>25</sup>

Wetlands, including marshes, are vital to the character of the waterfront, they help filter pollution, ensure continuance of breeding areas for local wildlife, and serve as nursing grounds for the fish and shellfish in the area.

## 7. Erosion and Flood Hazards

Given the low elevation of Long Beach, as well as its location as a barrier island, located between two large water bodies (the Atlantic Ocean and Reynolds Channel), the City is very susceptible to storm damage, including erosion and flooding, along its Atlantic Ocean frontage and flooding along Reynolds Channel and the Canals during periods of storms and rising tides.

<sup>23</sup> Tidal Wetland Losses in Nassau and Suffolk Counties, New York State Department of Environmental Conservation, <http://www.dec.state.ny.us/website/dfwmr/marine/wetlands/index.html>, accessed 4/6/2007.

<sup>24</sup> Ibid.

<sup>25</sup> New York State Salt Marsh Restoration and Monitoring Guidelines, Niedowski, Nancy, L., for the New York State Department of State Division of Coastal Resources and New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, December 1, 2000.

## a. Erosion

## (1) Atlantic Ocean

As stated previously, the City of Long Beach is located on a barrier island and the terrain of the island is low-lying and flat with elevations generally less than 10 feet above National Geodetic Vertical Datum (NGVD). Although some areas of the oceanfront are duned, the oceanfront shoreline of Long Beach Island generally consists of a continuous strip of generally low-lying beach with a series of groins along the oceanfront.<sup>26</sup>

Prevailing winds are from the southwest from April through September and from the west between October through March. Most winds are of moderate velocity (14 to 28 miles per hour). Hurricanes are the most destructive storms affecting the Atlantic coast shoreline, but nor'easters can be nearly as destructive, and both types of storms are responsible for the erosion of beaches in Long Beach.<sup>27</sup>

On the Atlantic Ocean coast, severe storms have caused a reduction in the overall beach height and width and accelerated deterioration of the groins. Continuing beach erosion combined with the low elevation exposes Long Beach Island to a high risk of “catastrophic damage from ocean flooding and wave attack.”<sup>28</sup> The rate of erosion is most severe in the eastern end of the barrier island.<sup>29</sup> The magnitude of shoreline changes has historically ranged from an erosive 23 feet per year at the eastern end of Long Beach Island to approximately 51 feet of annual accretion in the west end. The location of accretive and erosive zones shifts alongshore over time, resulting in any given location experiencing cycles of both deposition and loss. It is anticipated that deterioration of groins alongshore, a rise in sea level and more severe storm events than occurred in the period from 1963 to 1988 will cause an increase in the rate of erosion over that which was measured in past decades.<sup>30</sup>

The groins are in a depleted state, they are not holding back sand and are providing little protection. The process and cost of filing for permits to replace the groins is prohibitive. Therefore, the City may never be able to replace the groins (additional information about the groins is provided in Chapter II.D.8).

Vegetated dunes are recognized by the City as offering the best natural protection against the ravages of sand, wind and water, as a result, the City of Long Beach established a dune protection zone. This zone is established in the

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<sup>26</sup> Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Final Feasibility Report with Final Environmental Impact Statement, Storm Damage Reduction Project, New York District, North Atlantic Division, Corp of Engineers, March 1998.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Final Feasibility Report with Final Environmental Impact Statement, Storm Damage Reduction Project, New York District, North Atlantic Division, Corp of Engineers, March 1998

City of Long Beach Code of Ordinances, Chapter 13, Article VII, Dune Protection, Sections 13-120 to 13-125, which state:

§13-120, Legislative findings.

The sand dunes and adjacent beaches on the ocean front which stands between the Atlantic Ocean and the upland within the City of Long Beach afford protection to the upland properties and improvements from coastal storm damage and erosion. Any removal or destructive modification of these sand dunes or beaches would weaken the integrity of this protective barrier and constitute a real danger to the health, safety and welfare of the inhabitants of the City of Long Beach. It is, therefore, imperative that the sand dunes and adjacent beaches be safeguarded through the maintenance of well-established vegetative dunes, which offer the best natural protection against the ravages of sand, wind and water.<sup>31</sup>

§13-121. Definitions. “...Dune. A ridge or hill of loose, windblown, or artificially placed material that principal component[s] is sand.”<sup>32</sup>

§13-122. Establishment of dune protection zone.

A dune protection zone is hereby established in the City of Long Beach, bounded as follows: On the south by the high water mark of the Atlantic Ocean; on the north by the northerly line of the Boardwalk, as shown on the land and tax map of the County of Nassau; on the west by the westerly boundary of the city; and on the east by an imaginary line being an extension of the easterly side of New York Avenue, southerly to the Atlantic Ocean.<sup>33</sup>

§13-123. Prohibitions.

(a). “It shall be unlawful for any person, firm, corporation or municipality to damage, destroy, remove, excavate or relocate any sand dune or portion thereof within the dune protection zone.”

(b). “It shall be unlawful...to kill, destroy or remove in any manner any vegetation growing within the dune protection zone, except that certain species of vegetation may be removed from or planted...specifically for erosion control with the approval of the city manager....”

(c). “No person...shall trespass upon the dunes, and it shall be an offense...to trespass or walk upon any sand dune within a dune protection zone....”

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<sup>31</sup> Code of Ordinances, City of Long Beach, New York, Article VII. Dune Protection, §13-120

<sup>32</sup> Code of Ordinances, City of Long Beach, New York, Article VII. Dune Protection, §13-121

<sup>33</sup> Code of Ordinances, City of Long Beach, New York, Article VII. Dune Protection, §13-122.

(d). “It shall be unlawful...to operate...a vehicle...within the dune protection zone, except as necessary for erosion control with the approval of the city manager....”<sup>34</sup>

§13-124. Penalties for violations; liability for damages.

The Code of Ordinances sets forth penalties, and sets forth liability to cover the full cost of restoration of the damage.

§13-125. Beach stabilization and erosion projects.

Pursuant to section 6-c of the general Municipal Law...the City of Long Beach...does hereby establish a reserve fund for various improvements to beach areas including, but not limited to, beach nourishment, jetty enhancement, dune replacement and construction...to be deposited in a...bank account to be known as “City of Long Beach Reserve Fund for Beach Stabilization and Erosion Projects.” Said account shall be funded...with moneys legally available for such purpose....

(2) Reynolds Channel

The South Shore Estuary Reserve, of which Long Beach is a part, has prepared a report on bay flooding and erosion. Although this report does not identify erosion hazards specific to Reynolds Channel, it does present relevant base information. Storms, high tides and flooding are the three principal conditions associated with bay flooding and erosion. Natural accretion is evident in land west of the Long Beach Bridge.<sup>35</sup>

b. Flood Hazard and Flood Prone Areas

(1) Ocean frontage

Coastal storms have caused damage and economic loss within Long Beach. Significant storm events occurred in September 1938, September 1944, November 1950, November 1953, August 1954, September 1960, March 1962, March 1984, September 1985, October 1991, December 1992 and March 1993. As a result of continued storm damage to Long Beach Island, in 1965 the New York District, Army Corps of Engineers prepared a draft survey report addressing storm damage protection for Long Beach Island.

Various modifications to the plan were made, but it was never adopted, and in 1971, the study was terminated. In 1988, in response to authorizing legislation passed in 1986, Federal funds were allocated to conduct a reconnaissance study and report. The resultant March 1989 report, “Atlantic Coast of Long Island, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Reconnaissance Report,” indicated that a 110-foot wide beach with an elevation of + 10 feet National Geodetic Vertical Datum (NGVD), backed by a +15 foot

<sup>34</sup> Code of Ordinances, City of Long Beach, New York, Article VII. Dune Protection, §13-123.

<sup>35</sup> Bay Flooding and Erosion in the Long Island South Shore Estuary Reserve: Findings and Recommendations. Executive Summary. 2005.

dune system with advance and continued beach nourishment would be an implementable design. A Feasibility Study for the recommendation was initiated in 1991. The project feasibility report was completed in February 1995 and the Pre- construction, Engineering, and Design phase was completed in September 1997. The “Atlantic Coast of Long Island, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Final Feasibility Report with Final Environmental Impact Statement (FEIS)” was completed and dated March 1998.

The non-federal sponsor of the project, the New York State Department of Environmental Conservation, requested that the Corps of Engineers reanalyze the area between the proposed new groins and existing groin field in the City of Long Beach before starting construction. A study was initiated in August 1998. The study utilized new modeling techniques that were unavailable during the feasibility study to finalize the groin field design. The final report summarizing the findings of the study was completed March 2000. Information and coordination meetings were held with local interests during development of the Feasibility Study. In February 2006, the Army Corps of Engineers published the “Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Hurricane and Storm Damage Reduction, Long Beach Island, New York, Limited Reevaluation Report with Draft Environmental Assessment” report. This report updated the recommended plan and incorporated changes to the 1995 Feasibility Report.

The final plan, for the entire project area, contained in the 2006 report included: a dune with a top elevation of +15 feet above NGVD with a top width of 25 feet with landward and seaward slopes of one foot vertical to five feet horizontal along the entire project area except where the City of Long Beach Boardwalk is located; a sand barrier located directly beneath the City of Long Beach boardwalk with a 25 foot crest width at elevation 15.0 feet NGVD with a one foot vertical to three feet horizontal landward slope and a one foot vertical to five feet horizontal seaward slope (except at boardwalk seaside ramp locations where the seaward slope was proposed at one foot vertical to two and one-half feet vertical); a beach berm extending 110 feet from the seaward toe of the recommended dune or sand barrier at an elevation of 10 feet NGVD, then gradually sloping to match the existing bathymetry; planting of dune grass and appropriate fencing; construction of dune walkovers, vehicle access ramps and comfort stations; rehabilitation of 17 groins, including 16 of the existing groins in the City of Long Beach, advance nourishment and periodic nourishment of the beach.<sup>36</sup>

Within the City of Long Beach, the Army Corps plan discussed above was comprised of three basic components, which included upgrading the rock groins, elevating the sand berm, and installing the sand barrier (dune) below the

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<sup>36</sup> Atlantic Coast of New York, Jones Inlet to East Rockaway Inlet, Hurricane and Storm Damage Reduction Long Beach Island, New York, Limited Reevaluation Report with Draft Environmental Assessment, New York District, North Atlantic Division, Corp of Engineers, February 2006, and Atlantic Coast of New York Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Storm Reduction Project, US Army Corps of Engineers, New York District, Fact Sheet, accessed April 16, 2007.

boardwalk. It was proposed to replace the boardwalk to allow for the installation of the barrier. It was also proposed to properly grade and fence existing dunes in the west and east ends of the City.

These recommendations were reviewed by the City, and after extensive public input and analysis, were not accepted by the Long Beach City Council in a vote taken in February 2006. The City subsequently submitted a letter to the New York State Department of Environmental Conservation (the non-Federal sponsor of the project) stating their desire not to participate in the project.<sup>37</sup>

The Atlantic Ocean frontage remains susceptible to flooding. The City issued a Request for Proposals (RFP) in 2006 to secure the services of a coastal expert to evaluate the ocean and bay conditions. Additionally, pursuant to section 6-c of the General Municipal Law, the City Council did establish a reserve fund for various improvements to beach areas including, but not limited to, beach nourishment, jetty enhancement, dune replacement and construction.

(2) Reynolds Channel and the Canals

The Atlantic Ocean frontage however is not the only waterfront vulnerable to potential flooding. Flooding along Reynolds Channel and the Canals also occurs during storms and rising tides due to existing bulkheads, largely on private property, that are not high enough to block rising waters. Also, existing tide flex valves installed along sewer outfalls emptying into Reynolds Channel are not adequately maintained, and when inoperable cause backflow through the stormwater system onto City streets. Exhibit \_\_\_\_\_, Outfall Locations, provides outfall locations within the City. Therefore, the sources of flooding on the north and south shores of the island, while different, both contribute to local flooding conditions and require solutions.

The South Shore Estuary Reserve and the New York State Department of State, Division of Coastal Resources surveyed community representatives involved in planning for emergency services from October 2003 through January 2005 specifically with respect to bay flooding. The three most commonly reported causes of damage were storm surge, storm water runoff, and flooding. Bay related flooding on roads, buildings, boardwalks and landscapes accounted for 40 percent of reported damages.<sup>38</sup>

The stillwater-surge elevation is the elevation of water due solely to the effects of the astronomical tides, storm surges, and water setup on the water surface. The tidal influence on Reynolds Channel causes a mean tide range of approximately 3.9 feet and a spring maximum range of 4.7 feet. Higher tides caused by nor'easter storms often impact Long Island. The currents associated with the ebb and flood tides vary throughout the Channel due to width of the

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<sup>37</sup> Atlantic Coast of New York Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Storm Reduction Project, US Army Corps of Engineers, New York District, Fact Sheet, accessed April 16, 2007.

<sup>38</sup> Bay Flooding and Erosion in the Long Island South Shore Estuary Reserve: Findings and Recommendations. Executive Summary. The Long Island South Shore Estuary Reserve Office and the New York State Department of State, Division of Coastal Resources.

channel and water depth. Between the railroad and highway bridge, the current is approximately 0.6 knots on the ebb (or falling) tide and 0.5 knots on the flood (or rising) tide.

The inclusion of wave heights increases the water-surface elevations. The height of a wave is dependent upon wind speed and its duration, depth of water and length of fetch. The wave crest elevation is the sum of the stillwater elevation and the portion of the wave height above the stillwater elevations.

Table II. C-2 lists the stillwater-surge elevations for Reynolds Channel for the various storm events.<sup>39</sup>

**Table II.C-2**  
**Reynolds Channel Stillwater-surge Elevations (above NGVD)<sup>40</sup>**

<b>10-year Storm Event</b>	<b>50-year Storm Event</b>	<b>100-year Storm Event</b>	<b>500-year Storm Event</b>
5.7 feet	6.5 feet	6.9 feet	7.7 feet

As shown above, it is evident that water levels could rise above some bulkheads located along Reynolds Channel and along the canals in Long Beach, which are built to an elevation of seven feet. Private landowners have often made additional improvements (such as decks) to their property based on the elevation of seven feet. As a result, these improvements may be prone to flooding. It is the City's policy that all new construction and repair of City-owned bulkheads will raise them to an elevation of nine feet. The purpose of the raised City-owned bulkheads, which are located at street ends or along City-owned property, is to protect street ends, City-owned property and private property to the maximum extent possible against surge and splashing action. A policy has not been developed requiring private property owners to raise bulkhead height to nine feet. As a result, the intermittent raised "teeth" cannot effectively prevent flooding along Reynolds Channel. Additional information about bulkheads is located in Chapter II.D.8.b.

### (3) Flood Insurance Rate Maps

Exhibit \_\_\_\_\_, Flood Insurance Rate Map designates flood insurance rate zones, and, in the 100-year floodplains, show whole-foot based flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.<sup>41</sup> As seen in Exhibit \_\_\_\_\_, Flood Insurance Rate Map, the majority of the City of Long Beach is classified as Zone AE, which are areas subject to inundation by a flood having a one- percent or greater probability of being equaled or exceeded during any given year (100-year flood event). This flood, which is referred to as the base flood, is the national standard on which the floodplain management and insurance requirements of the NFIP

<sup>39</sup> Flood Insurance Study, Nassau County, New York. Federal Emergency Management Agency. April 2, 1997.

<sup>40</sup> Ibid.

<sup>41</sup> Ibid.

(National Flood Insurance Program) are based. Land along the Atlantic Ocean coast, including the boardwalk, is classified as VE, which is an area subject to the 100-year flood but also includes the possibility of velocity hazard or wave action. Portions of Long Beach along Long Beach Boulevard and on the eastern side of the city are classified as Zone X, which are areas that are susceptible to the 500-year flood, areas of 100-year flood with average depths of less than one foot or with drainage areas of less than one square mile and areas protected by levees from the 100-year flood. These areas are the least prone to damage from flood events.

Based on the current FEMA delineation of the 100-year tidal inundation area, the Long Beach Island Regional Planning Board estimates that over 3,000 homes on Long Beach Island which includes the communities of Lido Beach, Long Beach, East Atlantic Beach, Atlantic Beach Estates and Atlantic Beach, would be flooded during a 100-year storm event, directly impacting thousands of residents. With roadway flooding likely to isolate the island from the mainland, the consequences of a large storm could be very severe.<sup>42</sup> A storm having a return period of 100 years is calculated to have an associated water level of 12.1 feet above NGVD.<sup>43</sup> Information about stormwater management efforts is located in Chapter II.F.2. Public Facilities, Stormwater Management.

## 8. Significant Fish and Wildlife Habitats

Long Beach is in close proximity to significant fish and wildlife habitats. Portions of Reynolds Channel are designated significant coastal fish and wildlife habitat (SCFWH) areas. To designate a SCFWH, the NYSDEC evaluates the significance of coastal fish and wildlife habitat areas, and, following a recommendation from the NYSDEC, the Department of State designates and maps specific areas.<sup>44</sup> For each designated SCFWH site, a habitat map and narrative are created that provide site-specific information, including a description of the habitat, its fish and wildlife values, and an impact assessment. Exhibit\_\_\_\_\_, Significant Coastal Fish and Wildlife Habitats, depicts the location of the two areas located in close proximity to Long Beach. Below is a narrative, which further describes these areas.

### a. West Hempstead Bay

West Hempstead Bay comprises approximately one-third of the vast Hempstead Bays wetland complex. The bay represents one of the largest undeveloped coastal wetland ecosystems in New York State. West Hempstead Bay is located north of Long Beach, along the south shore of Long Island, between the Villages of Lawrence and Island Park, in the Town of Hempstead. This approximately 400 acre area is generally defined by the mean high water elevation on the west, north and east sides, and by the centerline of Reynolds Channel to the south.

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<sup>42</sup> Ibid.

<sup>43</sup> Ibid.

<sup>44</sup> Significant Coastal Fish and Wildlife Habitats. New York State Division of Coastal Resources, Coastal Fish and Wildlife Rating Forms. 1987.

INSERT EXHIBIT 7  
OUTFALL LOCATIONS

INSERT EXHIBIT 8  
FLOOD INSURANCE RATE MAP

The fish and wildlife habitat is the entire bay, which includes extensive areas of undeveloped salt marsh, tidal flats, dredge spoil islands and open water. Water depths in the bay vary from less than six feet (below mean low water) in the natural creeks and bays, to over 30 feet in portions of some of the dredge navigation channels. Tidal fluctuations in the bay average approximately 3.6 – 4.2 feet. West Hempstead Bay is owned by the Town of Hempstead and is managed as a wetland conservation area, with the allowance for mosquito control activities (ditching). The bay is surrounded by residential development, small craft harbor facilities, and commercial and industrial facilities, including oil terminals.

This highly diverse area is important to fish and wildlife throughout the year. Common terns nest in many locations throughout the bay, including Hewlett Hassock, Lawrence Marsh, North Green Sedge Island, and Nums Marsh. An estimated 75 breeding pairs and 132 pairs, respectively, of common terns were observed in the area during 1984 and 1985. West Hempstead Bay is also inhabited by a variety of nesting heron species, including snowy egret, great egret, black-crowned night heron, and green-backed heron. This area is also one of the few locations on Long Island where yellow-crowned night heron, tri-colored heron, and little blue heron have been found nesting. Heronries have been located on Pearsall's Hassock, North and South Black Banks Hassock, Lawrence Marsh, North Green Sedge Island, and Boorman's Island. Nests are usually placed in woody vegetation which has been established and enhanced by management activities by the Town of Hempstead on abandoned dredge spoil deposits. As of 1977, Pearsall's Hassock contained some of the largest nesting concentrations of snowy egrets, great egrets, and glossy ibis in New York State, with estimates of 227, 30, and 260 pairs, respectively. In 1985, Black Banks Hassock contained significant concentrations of snowy egrets, great egrets and glossy ibis. Other species nesting in West Hempstead Bay include Canada goose, black duck, mallard, herring gull, great black-backed gull, clapper rail, willet, Forster's tern, fish crow, marsh wren, boat-tailed grackle, sharp-tailed sparrow, and seaside sparrow. The salt marshes, intertidal flats, and shallows in this area are used extensively as feeding areas for birds nesting here and for many other species during migrations (shorebirds in particular).

West Hempstead Bay is one of the most important waterfowl wintering areas (November to March) on Long Island. Mid-winter aerial surveys of waterfowl abundance for the ten year period 1975-1984 indicate average concentrations of over 3,200 birds in the bay each year (8,325 in peak year), including approximately 2,700 brant (8,325 in peak year), and 345 black ducks (1,150 in peak year), along with lesser numbers of scaup, mallard, Canada goose, oldsquaw, bufflehead, and red-breasted merganser. West Hempstead Bay supports one of the largest wintering concentrations of brant in New York State. Waterfowl use of the bay during winter is influenced in part by the extent of ice cover each year. Generally, brant and geese feed in open water areas through midwinter, while later in spring (prior to migration), the birds feed extensively in the salt marshes. Concentrations of waterfowl also occur in the area during spring and fall migrations (March to April, and October to November, respectively).

INSERT EXHIBIT 9  
SIGNIFICANT COASTAL FISH AND WILDLIFE HABITATS

In addition to having significant bird concentrations, West Hempstead Bay is a productive area for marine finfish, shellfish, and other wildlife. The bay serves as a nursery and feeding area (April to November, generally) for bluefish, black sea bass, striped bass, winter flounder, summer flounder, kingfish, weakfish, blackfish, and snapper. As a result of the abundant fisheries resources in the bay, and its proximity to the New York metropolitan area, West Hempstead Bay receives heavy recreational fishing pressure, of regional significance. The bay is inhabited by hard clams, soft clams, and ribbed mussels, but none of the bay waters are certified for shellfishing. There is considerable potential for harvesting young clams from the area for transplanting into commercial aquaculture areas. Diamondback terrapin nest among the salt marsh islands in the bay.

b. Middle Hempstead Bay

Middle Hempstead Bay ("Middle Bay") is located along the south shore of Long Island, between the Village of Island Park and the Meadowbrook State Parkway, in the Town of Hempstead. This approximate 5,000 acre area is generally defined by the mean high water elevation on all sides, except just west of Jones Inlet, where it extends to the center line of the Reynolds and Sloop Channels. The fish and wildlife habitat is the entire bay. Most of Middle Hempstead Bay is owned by the Town of Hempstead and is managed as a wetland conservation area, with allowance for mosquito control activities (ditching). The bay is surrounded by residential development and small craft harbor facilities, except on the east side, which is bordered by undeveloped right-of-way for the Meadowbrook Parkway.

Middle Hempstead Bay comprises approximately one-third of the vast Hempstead Bays wetland complex. The bay represents one of the largest undeveloped coastal wetland ecosystems in New York State. This highly diverse area is important to fish and wildlife throughout the year.

Common terns nest in many locations throughout the bay, including Garrett Marsh, East Channel Islands, North Cinder Island, Gull Island, and Cinder Island. In 1984 and 1985 a total of approximately 575 pairs and 325 pairs, respectively, of common terns were observed nesting in Middle Bay. Middle Bay is also inhabited by a variety of nesting heron species, including snowy egret, great egret, black-crowned night heron, and green-backed heron. This area is also one of the few locations on Long Island where yellow-crowned night heron and tri-colored heron have been found nesting. Heronries have been located on South Pine Marsh, on Smith Meadow, south of Little Swift Creek, on Meadow Island, along the Loop Parkway (1986), and possibly on High Meadow Island. Nests are usually placed in woody vegetation, which has become established on abandoned dredge spoil deposits. As of 1977, Smith Meadow contained regionally significant nesting concentrations of snowy egret, black-crowned night heron, and glossy ibis, with estimates of 165, 95, and 53 pairs, respectively.

Other species nesting in Middle Hempstead Bay include Canada goose, black duck, mallard, herring gull, American oystercatcher, clapper rail, willet, gull-billed tern,

fish crow, marsh wren, sharp-tailed sparrow, and seaside sparrow. The salt marshes, intertidal flats, and shallows in this area are used extensively as feeding areas for birds nesting here and for many other species during migration (shorebirds in particular).

Middle Hempstead Bay is one of the most important waterfowl wintering areas (November to March) on Long Island. Mid-winter aerial surveys of waterfowl abundance for the ten year period 1975-1984 indicate average concentrations of over 6,600 birds in the bay each year (26,855 in peak year), including approximately 4,200 brant (10,880 in peak year), 2,000 scaup (17,750 in peak year), and 230 black ducks (975 in peak year), along with lesser numbers of bufflehead, common goldeneye, canvasback, mallard, Canada goose, oldsquaw, and red-breasted merganser. Middle Bay supports the largest wintering concentration of brant in New York State. Waterfowl use of the bay during winter is influenced in part by the extent of ice cover each year. Generally, brant and geese feed in open water areas through midwinter, while later in spring (prior to migration), the birds feed extensively in the salt marshes. Concentrations of waterfowl also occur in the area during spring and fall migrations (March to April, and October to November, respectively).

In addition to having significant bird concentrations, Middle Hempstead Bay is a productive area for marine finfish, shellfish, and other wildlife. The bay serves as a nursery and feeding area (from April to November, generally) for bluefish, winter flounder, summer flounder, kingfish, weakfish, blackfish, scup, blue claw crab, and forage fish species, such as Atlantic silverside, pipefish, and sticklebacks. As a result of the abundant fisheries resources in the bay, and its proximity to the New York metropolitan area, Middle Bay receives heavy recreational fishing pressure, of regional significance. The bay is inhabited by hard clams, soft clams, ribbed mussels, and blue mussels, but most of the bay waters are not certified for shellfishing. There is considerable potential for harvesting young clams from the area for transplanting into commercial aquaculture areas. Diamondback terrapin nest among the salt marsh islands in the bay, and at the Oceanside Marine Nature Study Area. Several facilities for environmental education are located around Middle Bay, providing nature study opportunities for many Nassau County residents.

## 9. Hunting

All of West Hempstead Bay and Middle Bay is open to the public for waterfowl hunting, and the area supports regionally significant hunting pressure. Muskrat populations in the area support a significant amount of trapping by local residents.

## 10. Vegetation

### a. Submerged Aquatic Vegetation (SAV)

The National Oceanic and Atmospheric Administration classifies underwater lands in U.S. waterways. Details about the structure and variability of Submerged Aquatic Vegetation (SAV) are important to understanding the health of the ecosystem, and are particularly relevant for shellfish managers to set realistic standards and expectations

for shellfish restoration efforts.<sup>45</sup> Research efforts indicate the Long Island South Shore Estuary has experienced a shift in recent decades from a ecosystem which enjoyed balanced and robust biological production, both in the pelagic region (water column) with a variety of phytoplankton and in the benthic region (bottom) dominated by eel grass and hard clams, to a region dominated by pelagic algae such as brown tide, which has a deleterious effect on commercially significant clams and scallops as well as SAV.<sup>46</sup>

Areas of SAV are typically found within areas of unconsolidated sediments. These areas are characterized by vegetation rooted in the substrate of a body of water (usually no deeper than 10 feet), that does not characteristically extend above the water surface and usually grow in associations or beds. It serves as nursery area for juveniles and supports adult populations of economically important seafood species. SAV beds also enhance water quality by reducing turbidity and stabilizing sediments. Exhibit\_\_\_\_\_, Submerged Aquatic Vegetation shows locations of SAV in Reynolds Channel, north of Long Beach.

It appears that the center areas of deeper channels in the Long Island South Shore Estuary are characterized as unknown benthic habitat. These areas are considered uninterpretable due to the depth of the water.

Bordering these areas, and areas of SAV and tidal marsh, are underwater lands classified as unconsolidated sediment. Unconsolidated sediment shores differ from bedrock shores in that the material is loose and non-cemented.

As discussed in Section II.C.5, tidal marshes are dynamic landscapes where the tides effect vegetated lands. With increasing tidal elevation, or increasing distance from the tidal source, the relative, direct, geomorphic influence of the tides decreases, and the relative influence of plants and animals increases.

#### b. Land Vegetation

The City of Long Beach is highly developed. Land vegetation is primarily limited to landscaped and lawn areas. The 2007 City of Long Beach Comprehensive Plan recommends preservation of existing street trees and coordinated planting of new street trees as a citywide program in both residential and commercial neighborhoods and that the City become part of the Tree City USA program.

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<sup>45</sup> New York State Sea Grant Institute. Breaking Thru: Coastlines. Vol. 33, No. 2, Summer 2004.

<sup>46</sup> New York State Sea Grant Institute. Breaking Thru: Coastlines. Vol. 33, No. 2, Summer 2004.

INSERT EXHIBIT 10  
SUBMERGED AQUATIC VEGETATION

In addition, vegetation on dunes exists within the City. As stated previously, the City of Long Beach has established a dune protection zone, the boundaries of which are the high water mark of the Atlantic Ocean to the south, the boardwalk to the north, the westerly boundary of the City to the west and on the east by an imaginary line being an extension of the easterly side of New York Avenue, southerly to the Atlantic Ocean.<sup>47</sup> The City of Long Beach dune protection ordinances state, in Article VII:

§13-123(b), “It shall be unlawful for any person...to kill, destroy or remove in any manner any vegetation growing within the dune protection zone, except that certain species of vegetation may be removed from or planted in the dune protection zone specifically for erosion control with the approval of the city manager or his duly designated representative.”

## 11. Climate

The climate of Long Beach is dominated by continental air masses directed by the westerly winds of the mid-latitudes, but the Atlantic Ocean coastal waters have a moderating influence. Long Beach averages 10 degrees warmer in the winter and 10 degrees cooler in the summer than inland communities on Long Island and in New York. The average warmest month is July, with an average high of 83 degrees. On average, the coolest month is January, with an average high of 39 degrees. The highest recorded temperature was 104°F in 1966. The lowest recorded temperature was -2°F in 1985. The most precipitation on average occurs in May, but is fairly evenly distributed throughout the year, with an average of 3.5 inches of precipitation a month. Average annual precipitation totals approximately 43 inches per year.<sup>48</sup>

## 12. Air Quality and Noise

### a. Air Quality

The US Environmental Protection Agency has circulated National Ambient Air Quality Standards (NAAQS) for the protection of public health and welfare. The City of Long Beach is located in the NYSDEC, Region 1, New York-New Jersey-Connecticut Air Quality Control Region (AQCR). The Bureau of Air Quality Surveillance is responsible for the maintenance and operation of ambient air quality monitoring networks throughout the State of New York. Currently there are more than 80 active sites where various parameters are measured, the closest to Long Beach being the Eisenhower Park and Babylon monitoring stations.

For sulfur dioxide, the annual average (1995 – 2005) has been approximately 0.005 ppm (parts per million), which is sufficiently below the 0.03 ppm New York State standard. Carbon monoxide averages range from 0.7 to 1.1 ppm in the years 1990–2000. Carbon monoxide concentrations, as measured at Eisenhower Park, are sufficiently lower than the 9 ppm New York State standard. Ozone levels, as measured at Babylon in Suffolk County, ranged from an average of 0.023 – 0.025 ppm in 1995–2005. The New York State standard for ozone is 0.08 for an eight-hour

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<sup>47</sup> Code of Ordinances, City of Long Beach, New York, Article VVII. Dune Protection, §13-120 and §13-122.

<sup>48</sup> The Weather Channel: Long Beach, NY. Accessed at [www.weather.com](http://www.weather.com) on July 25, 2006.

period. Nitrogen dioxide is measured in Eisenhower Park. Nitric oxide concentrations were measured at an average of 0.021 to 0.026 ppm in 1995 – 2005, which is below the New York State standard of 0.05 ppm.<sup>49</sup>

NYS DEC maintains an Air Quality Index (AQI) for reporting the daily air quality for particular regions throughout the State of New York. The AQI provides a method to correlate the different levels of pollutants to one scale. An air quality index report was recently prepared, the results of which indicate that the air quality, as measured in Babylon, N.Y. was classified as good.<sup>50</sup>

b. Noise

The major contributors to noise in the City of Long Beach include aircraft, automobile and truck traffic. Noise generated by aircraft is associated with traffic from the JFK International Airport, which is located approximately four miles to the west of Long Beach.<sup>51</sup>

### 13. Historic Resources

The City passed a Landmark Preservation Ordinance in 1995 that created a Landmarks Preservation Commission, composed of members of the Architectural Review Board. This Commission reviews applications for landmark designations. Approved applications then have a public hearing and are voted on by the City Council. Only a property owner may request the designation of owned property as a landmark. The Commission is also responsible for reviewing all plans for the moving, exterior construction, addition, alternation or repair, landscaping or demolition of landmarks. The Commission is only allowed to review the publicly visible exterior of a structure. The Commission reviews plans for consistency with the materials and style of the architectural period of which the building is characteristic. Owners of landmark sites are eligible to apply for community development fund loans for rehabilitation, repair, and/or preservation.

The City of Long Beach currently has several buildings, predominately in the Westholme South neighborhood, that have designation on either the local, state or national historic registers. The following are buildings with these designations:

- Granada Towers - 305 Riverside Boulevard – national/state register
- 151 West Penn Street - national/state register; local landmark
- 226 West Penn Street (Long Beach Historical Museum) - local landmark
- 220 West Penn Street (St. James Church) - local landmark
- 257 West Olive Street - local landmark

The Long Beach Historical and Preservation Society owns and operates the Long Beach Historical Museum. The museum opened in 1997 and houses historical archives, a gift shop, computer room and exhibits. The Society hosts talks, lectures, educational tours, classes, holiday parties and dinners. The Society also started a historical marker

<sup>49</sup> 2005 Air Quality Data. NYSDEC Region 1. Accessed August 21, 2006 from <http://www.dec.state.ny.us/website/dar/baqs/aqreport/05arr1.html>.

<sup>50</sup> AQI Air Monitoring Data. Data for July 20, 2006. Accessed July 20, 2006 from

<http://www.dec.state.ny.us/website/dardata/airmon/515002aqisite.htm>

<sup>51</sup> Local Waterfront Revitalization Program Draft. City of Long Beach, New York. December 1985.

program. Several homes now have historic plaques to mark the historic building periods in the city.

The Long Beach Historical and Preservation Society is currently undertaking a detailed survey of the city's historic properties. The goal of the Society is to educate and emphasize the importance of Long Beach as a historic planned community. To that end, the Society is planning to seek local and state and national register historic district designation for the downtown area and the Reynolds homes area on Penn, Walnut and Olive Streets. The Society also plans to focus on the historic importance of the boardwalk.

The Long Beach Island Landmarks Association, a non-profit organization that promotes landmark sites in all the communities on the island, including the City of Long Beach, worked on an application to the City of Long Beach to create a Long Beach Historic District that would include the West Penn Street blockfront with parcels from National Boulevard to Lafayette Boulevard. At its September 18, 2007 regular meeting, the City Council approved the application to the Landmarks Preservation Commission to designate the 100, 200, 300 blocks of West Penn Street, located between National Boulevard and Lafayette Boulevard, and the 600 block of West Penn Street, located between Lindell Boulevard and Grand Boulevard, as Landmark Red Brick Streets. Historic designation would require that planned exterior renovations of homes in a historic district would need to be reviewed by the Landmarks Preservation Commission. Additional areas of concern include the Foundation Block, which the Association seeks to declare as a historic and archeological site. Such a designation would require detailed testing for artifacts and coordination with the New York State Office of Parks, Recreation and Historic Preservation as part of the planning for future use of this property.

#### 14. Scenic Resources and Important Vistas

The city's scenic resources are its views to the waterfront, to Reynolds Channel, the Atlantic Ocean and the Canals. The city's grid street system has generally provided the best framework for establishing and maintaining view corridors to the water – be it the ocean or bay. It is only when these public corridors are interrupted by development, that public visual access is breached. Such is the case on West Chester Street where new blocks of townhouses impede views to the bay or on streets in the West End, such as Kentucky Street, where views to the ocean are blocked.

Additional scenic resources are:

**Canals:** Located on the eastern side of each of the four Canals are public greenways. However, over time, adjacent private landowners have utilized some of this land for private purposes. Private uses include decks, boat or car storage, and dining areas. Some residents run electrical wiring through this green space to provide electricity and water to adjacent docks on upland private uses. This represents a potential hazard to public utility personnel who may undertake public operations or maintenance activities on this land.

Located at the ends of each Canal is a small green street mall. These parklets allow visitors to enjoy the views of the Canals through to Reynolds Channel. Views of the

Canals and Reynolds Channel are also available from the Clark Street Playground, located at the terminus of Clark Street in the Canals neighborhood. However, the Clark Street playground is currently closed due to significant degradation of the land due to erosion.

**Reynolds Channel:** Publicly accessible views to Reynolds Channel exist throughout the City at north-south street ends. However, a number of the street ends feature bulkheads, which include chain link fencing, which serves to impede the beauty of the views. Public views to Reynolds Channel are also available along the Esplanade. The bayfront, while not as publicly accessible as the beach, offers its own type of recreation, including fishing and boating. The bayfront esplanade, which runs the length of Veteran's Memorial Park and along West Bay Drive from Magnolia Boulevard to Washington Boulevard, also provides opportunity to view Reynolds Channel and its environs. Views to the bayfront are also available from Veteran's Memorial Park itself. This park features multi-purpose ballfields, an outdoor roller hockey rink, skateboard park, basketball courts, bayfront esplanade, fitness trail, and a boat ramp. Public access is also available behind the tennis bubbles located at the northern terminus of Monroe Boulevard, although no fishing is officially permitted at this location. A fishing pier is located at the terminus of Magnolia Boulevard.

Views of Reynolds Channel are also available from the Clark Street Playground, located at the terminus of Clark Street in the Canals neighborhood.

**Atlantic Ocean:** Views of the Atlantic Ocean and the beach are available from the publicly accessible north-south street-ends, Ocean Beach Park and the boardwalk. The 2¼-mile boardwalk, stretches from New York Avenue to Neptune Boulevard and features benches, jogging and bicycle pathways. The boardwalk also provides public access to Ocean Beach Park. Pacific Playground, located along Shore Road between Roosevelt Boulevard and Pacific Boulevard and Magnolia Playground, located at the southern terminus of Magnolia Boulevard, provide public access to views of the Atlantic Ocean, as well as opportunities for recreation. It should be noted that significant residential development along the southern side of Broadway and Shore Road have limited public views to the oceanfront by orienting development parallel to both the roadway and the Ocean, limiting views and breezes.